

Appl. No. 10/005,179
Amdt. Dated December 5, 2003
Reply to Office Action of September 12, 2003

Attorney Docket No. 81863.0013
Customer No.: 26021

REMARKS/ARGUMENTS:

New claims 7-15 are added. Support for new claims 7-12 can be found on p. 7, line 17-p. 8, line 2 of the specification. Support for new claim 13 can be found on p. 8, lines 3-11 of the specification. Support for new claim 14 can be found on p. 8, lines 22-24 of the specification. Support for new claim 15 can be found on p. 5, lines 16-18 of the specification. Claims 1-15 are pending in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

The present invention relates to a novel dielectric ceramic material which shows a high relative dielectric constant and a high Q factor in high frequency regions such as microwaves and millimeter waves and, more particularly, to a dielectric material suitable for forming high frequency electronic components such as dielectric resonator, filter and capacitor, dielectric substrate for MIC and waveguide for millimeter-wave applications. (Applicant's specification, at p. 1, lines 6-13).

CLAIM REJECTIONS UNDER 35 U.S.C. § 103:

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hiramatsu (U.S. Patent No.6,051,515) further in view of Hirahara et al. (U.S. Patent No.5,432,135). The Applicant respectfully traverses this rejection. Claim 1 is as follows:

A dielectric ceramic material comprising a solid solution of which dominant crystal phase comprises a perovskite crystal, and the perovskite crystal comprises a complex oxide of at least Ba, Sr, Mg, W and a rare earth element.

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Applicant respectfully submits that the cited references cannot render claim 1 obvious, because the cited references fail to teach or suggest a ceramic material with perovskite crystal comprising a complex oxide of at least Ba, Sr, Mg, W and a rare earth element. The present invention is based upon the discovery that a perovskite crystal comprising Ba, Sr, Mg, W and a rare earth element improves the Q factor and provides a dielectric constant that is less dependent on temperature. (Applicant's specification, at p. 5, line 8-p. 8, line15).

Hiramatsu teaches a "dielectric ceramic comprising a perovskite-type crystal phase being precipitated as a main crystal phase and a complex oxide crystal phase other than the perovskite-type crystal phase being precipitated as a sub-crystal phase, wherein the perovskite-type crystal phase contains Mg, W, an iron family metal elements and/or Zn, and Ba and/or Sr as metal elements, the complex oxide crystal phase contains W, Ba and/or Sr as metal elements." (Hiramatsu, column 1, lines 43-51).

Hiramatsu fails to teach or suggest a rare earth oxide in the perovskite crystal composition and is not relied on by the Office for such. Instead, the Office cites Hirahara for teaching "a perovskite dielectric composition similar to the perovskite taught by Hiramatsu and that claimed including MgO, BaO and WO₃ to be used in dielectric Rare earth oxide is added to the composition to transfer the resonance frequency to a suitable value on the positive side" The Office states, "It would have been obvious to one of ordinary skill in the art at the time of the invention to further include a rare earth oxide in the composition of Hiramatsu because of the improvement in the temperature coefficient of resonance frequency as taught by Hirahara et al."

The Applicant respectfully disagrees with the Office's reading of Hirahara as well as the Office's assertion that it would have been obvious to combine Hirahara with Hiramatsu. Hirahara does not teach or suggest that its ceramic composition

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comprises a perovskite crystal. Hirahara gives no indication that diffraction techniques or any techniques were used to determine whether a perovskite crystal structure existed. In addition, the ceramic of Hirahara lacks Sr. Therefore, based on Hirahara's teaching and without the hindsight of the present invention, those skilled in the art would not know what effect the addition of a rare earth oxide to a perovskite crystal comprising a Ba, Mg, W, and Sr oxide would have, because Hirahara only demonstrated that the addition of a rare earth oxide to a ceramic, of unknown crystal structure, comprising a Ba, Mg, and W oxide transferred the temperature coefficient of the resonance frequency to a positive side.

Furthermore, the Applicant's specification provides evidence of the unpredictability of the art. Specifically, the Office is referred to Sample Nos. 33-37 in Table 1 on p. 14 of the Applicant's specification. These examples demonstrate the criticality of having all four metal oxides, i.e., Ba, Mg, W, and Sr. If only one of these metal oxides is absent, the addition of a rare earth oxide would not produce a ceramic material with the desired characteristics. Sample 34 illustrates that if a Sr oxide is absent from a perovskite crystal comprising a Ba, Mg, and W oxide, the desired characteristics, of an improved Q factor and a dielectric constant that is less dependent on temperature, would not be obtained.

Based on the foregoing, Applicant respectfully submits that the Office has failed to establish a prima facie case of obviousness because there is no motivation to combine the references in the manner suggested by the Office.

In light of the foregoing, Applicant respectfully submits that Hiramatsu and Hirahara could not have made claim 1 obvious, because the combination of references fails to teach or suggest each and every claim limitation. Claims 2-6 depend from claim 1 and cannot be made obvious for at least the same reasons as claim 1. Withdrawal of these rejections is thus respectfully requested.

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New claims 7-15 depend from claim 1 and are believed to be patentable for at least the same reasons as claim 1.

The art made of record but not relied upon by the Examiner has been considered. However, it is submitted that this art neither describes nor suggests the presently claimed invention.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6700 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
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